

THE INVENTION CLAIMED IS

1. A sol-gel process for synthesizing nanostructured metal-oxide materials, the improvement includes:
forming a solution containing dissolved metal salts, and
adding a proton scavenger to the solution for inducing and controlling gelation.

2. The improvement of Claim 1, wherein the proton scavenger is selected from the group consisting of butadiene monoxide, cyclohexene oxide, *cis*-2,3-epoxybutane, propylene oxide, 1,2-epoxybutane, 1,2-epoxypentane, 2,3 epoxy(propyl) benzene, glycidol, epichlorohydrin, epifluorohydrin, epibromohydrin and trimethylene oxide.

3. The sol-gel process of Claim 1, which also includes forming the solution using solvents selected from the group consisting of water, alcohol solvents including methanol, ethanol, 1-propanol, t-butanol, and organic solvents including dimethylformamide, acetone, ethylene glycol, propylene glycol, and benzyl alcohol.

4. The sol-gel process of Claim 1, which also includes carrying out the synthesis under room conditions of temperature and atmosphere.

5. The sol-gel process of Claim 1, which also includes drying of the thus formed gel to produce an aerogel or a xerogel.

6. The sol-gel process of Claim 5, wherein the aerogel is produced by drying the gel using supercritical extraction, and wherein the xerogel is produced by drying the gel using evaporation.

7. The sol-gel process of Claim 1, wherein the inorganic salts are selected from the group consisting of Fe^{3+} , Cr^{3+} , Al^{3+} , Ga^{3+} , In^{3+} , Hf^{4+} , Sn^{4+} , Zr^{4+} , Nb^{5+} , W^{6+} , Pr^{3+} , Er^{3+} , Nd^{3+} , Ce^{3+} , U^{3+} and Y^{3+} .

8. The sol-gel process of Claim 1, wherein synthesizing metal-oxide materials is carried out by producing nanostructured oxides formed from the following elements of the periodic table: Groups 2 through 13, part of Group 14 (germanium, tin, lead), part of Group 15 (antimony, bismuth), part of Group 16 (polonium), and the lanthanides and actinides.